



Express Mail Label No. EV 368074781 US
Application No. 10/005,797
Attorney Docket No. 3957-8-DIV

REMARKS/ARGUMENTS

Applicants note thank the Examiner for the indication of allowable subject matter in Claims 2, 7, 42 and 47. The Applicants respectfully request that the Examiner consider the following remarks in addition to the amended and new claims presented above. Claims 4 and 44 have been canceled. New claims 50-55 have been added. Claims 1 and 40 have been amended. Support for the new and amended claims can be found in the specification as originally filed, for example, on:

Page 3, line 1 to Page 6, line 5;

Page 14, line 23 to Page 15, line 7; and

Figs. 5A, and 15-16.

Accordingly, Claims 1-3, 5-7, 37-43, and 45-55 are pending in this application.

The Examiner rejects claims 1 and 37-39 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,964,341 to Herbert ("Herbert). Additionally, the Examiner rejects Claims 3-6 and 40, 41, 48 and 49 under 35 U.S.C. § 103(a) as being obvious over Hebert.

The Applicants respectfully traverse the rejections for at least the following reasons.

Herbert fails to teach or suggest at least the following italicized features of independent Claims 1, 40, and newly added Claim 50:

1. A system for launching a projectile to remove a body of rock in an excavation, comprising:
 - a projectile that includes:
 - a body containing an explosive charge;

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a nose having a central portion in fixed relation to said body and extending across a substantial portion of a front face of the nose, said central portion being one of substantially flat and concave to inhibit deflection of the projectile from a face of the rock; and
a tail having a plurality of fins to control the trajectory of the projectile, wherein the fins have a length and the length is at least about 60% of the total length of the projectile;
and

a tube for launching the projectile, wherein the nose is the one of substantially flat and concave after launch from the tube and a center of gravity of the projectile is located in the body and a center of pressure of the projectile is located in the tail.

40. A system for launching a projectile to remove a body of rock in an excavation, comprising:

projectile means for removing the body of rock that includes:

body means for containing an explosive charge;

nose means for contacting the body of rock, the nose means having a central portion in fixed relation to said body means and extending across a substantial portion of a front face of the nose, said central portion being one of substantially flat and concave to inhibit deflection of the projectile means from a face of the rock; and

tail means having a plurality of fins for controlling the trajectory of the projectile means, wherein the fins have a length and the length is at least about 60% of the total length of the projectile; and

tube means for launching the projectile, wherein the nose means is the one of substantially flat and concave after launch from the tube means.

50. A method of launching a projectile to remove a body of rock in an excavation, comprising:

launching a projectile from a tube, wherein the projectile includes:

a body containing an explosive charge;

a nose being one of substantially flat and concave to inhibit deflection of the projectile from a face of the rock; and

a tail having a plurality of fins to control the trajectory of the projectile, wherein the fins have a length and the length is at least about 60% of the total length of the projectile;

while in flight, maintaining the nose with an effective air resistance profile that is the one of substantially flat and concave for a duration of the flight of the projectile.

Accordingly, for at least these reasons, Claims 1-3, 5-7, 37-43, and 45-55 are patentable over Herbert.

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The presently claimed invention is directed to a projectile having a flat or concave nose on the projectile to slow the speed of the projectile. The slower projectile speed and nose profile reduce the likelihood that the projectile will ricochet off of a rock and explode in an undesired area.

In contrast, Herbert is generally directed to an extendible probe assembly which streamlines the effective profile of the projectile and actually reduces drag (or air resistance) of the projectile during flight. Herbert discloses that its centrally-positioned probe is movable from a retracted position to a fully extended position immediately after launching of the projectile. Specifically, the probe is moved to its extended locked drag-reducing position by ram air action which is converted into a forwardly acting force on the probe during forward motion of the projectile. Thus, the probe projects forward shortly after the projectile is fired from a barrel (which is stated as being about 0.013 seconds after firing or after approximately 40 feet of projectile travel from the muzzle (col. 3, lines 57-61)). Regarding the effect of the probe, Hebert states at col. 3, line 66-col. 4, line 2:

The length of the probe, when fully extended, causes the Mach cone to pass outside of the blunt nose of the body, with the flow interior of the shock wave being stagnated, *thus effectively providing a nose cone for the projectile at supersonic speeds.* (Emphasis supplied.)

Thus, almost immediately after launch, the projectile of Herbert has an effective air resistance profile which will reduce drag, and which is designed to travel at Mach velocities or supersonic speed. Because the centrally-positioned, extendable probe of Herbert is intended to reduce rather than increase drag as in the claimed invention, and because Herbert does not

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disclose a projectile comprising a nose having a central substantially flat or concave portion extending across a substantial portion of a front face of the nose in fixed relation to the body of the projectile, Herbert does not teach or suggest the claimed invention.

In addition, because Herbert is concerned with propelling a projectile at Mach velocities and reducing drag on the projectile in flight with its extendable probe assembly, Herbert fails to teach the maintenance of a substantially flat or concave nose throughout the entire flight of the projectile. In fact, Herbert teaches away from launching the projectile from a tube and while in flight, maintaining the nose with an effective profile that is the one of substantially flat and concave for a duration of the flight of the projectile because the nose profile of Herbert changes from a substantially flat profile to a streamlined, drag reducing profile generally within 0.013 seconds after launch.

Moreover, Herbert does not teach or suggest fins having a length of at least about 60% of the total length of the projectile as claimed. *See* Figs. 1-3 of Herbert. These relatively larger fins provide the substantially flat or concave nosed projectile of the claimed invention with stability during flight. Clearly, as shown in Figs. 1-3, fins 13c of Herbert are not at least about 60% of the total length of the projectile, nor is there any teaching as to the desirability of providing fins having a length of at least about 60% of the total length of the projectile.

The dependent claims provide further reasons for allowance.



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By way of example, dependent Claim 3 is directed to the outer diameter of the body being no less than about 25% and no more than about 100% of the outer diameter of the tail. (See also Claims 43 and 52).

Dependent Claim 5 is directed to a gap between a sidewall of the detonating device and a sidewall of the pocket ranging from about 0.5 to about 4.0 mm. (See also Claims 45 and 54).

Dependent Claim 6 is directed to a gap existing between an inner wall of the pocket and an outer wall of the detonating device, and the gap ranging from about 0.5 to about 4.0 mm. (See new Claims 46 and 55).

It is believed that no fees are due relating to this Amendment. However, any additional fees that may be associated with this Amendment may be charged to Deposit Account No. 19-1970.

If the Examiner has any questions concerning this Amendment or this application in general, he is encouraged to contact the undersigned attorney.

Respectfully submitted,

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